K051733

DEC 7 2005

SUMMARY OF SAFETY AND EFFECTIVENESS FOR DRG SALIVARY CORTISOL ELISA

Manufacturer: DRG International, Inc.
1167 U.S. Highway 22
Mountainside, NJ 07092

Contact Information: Lehnus & Associates
Gary Lehnus
150 Cherry Lane Rd.
East Stroudsburg, PA 18301
Tel: (570) 620-0198

Device Name / Classification:
The device trade name is the DRG SLV Cortisol ELISA having FDA assigned name: Cortisol test system, 21 CFR, **862.1205**, categorized as Class II medical devices for the Clinical Chemistry and Clinical Toxicology Panel, as Product Code **NHG**.

Test Principle
The DRG Salivary Cortisol ELISA KIT is based on the competition principle and the microplate separation. An unknown amount of Cortisol present in the sample and a fixed amount of Cortisol conjugated with horseradish peroxidase compete for the binding sites of mouse polyclonal Cortisol-antiserum coated onto the wells. After one hour incubation the microplate is washed to stop the competition reaction. After addition of the TMB substrate solution the concentration of Cortisol is inversely proportional to the optical density measured.

Device Intended Use:
An enzyme immunoassay for the quantitative *in vitro diagnostic* measurement of active free cortisol (hydrocortisone and hydroxycorticosterone) in saliva. Measurements of cortisol are used in the diagnosis and treatment of disorders of the adrenal gland.

Device Performance
Normal Range Study
In order to determine the normal range of SLV cortisol, 109 saliva samples from adult male and female apparently healthy subjects, ages 20 to 80 years, were collected in the morning and analyzed using the DRG SLV Cortisol ELISA kit. The following range was calculated from this study.

Adults: 0.12 – 1.47 µg/dL or 1.2 – 14.7 ng/mL (AM collection)

Method comparison
Studies were performed to compare the DRG SLV Cortisol test to commercially available tests. One study evaluated saliva samples from 114 subjects ages 40 to 70 years. The samples were run in duplicate on the DRG test and another commercially available LIA method to determine the concentration of Cortisol in the samples. A correlation of 0.872 was obtained versus this method.
A second study was performed using saliva samples from seventy-two (72) saliva samples collected from 40 – 70 year old men and women and run in duplicate on DRG

and another commercially available EIA test. A correlation of 0.936 was observed compared to another EIA method.

Another study was performed comparing 28 saliva samples to a reference LC-MS method. A correlation of r = 0.89056 with a formula of y = 1.0144x + 1.7762 was obtained to this method.

To further demonstrate substantial equivalence of the DRG SLV test, additional expanded comparison studies were requested. One expanded study evaluated saliva samples from 40 subjects ages 25 – 65 years. The samples were run in duplicate on the DRG test and another commercially available LIA method to determine the concentration of Cortisol in the samples. An overall correlation of 0.9795 and a regression formula of y = 0.9588x - 0.0338 was obtained versus this method.

A second expanded study was performed using 40 saliva samples collected from men and women ages 25 – 65 years and run in duplicate on DRG and another commercially available EIA test. A correlation of 0.9920 with a regression formula of y = 1.0722x + 0.1482 was observed compared to another EIA method.
The DRG Cortisol ELISA test demonstrated equivalent performance to commercially available ELISA and LIA methods for detection of Cortisol in saliva.

Sensitivity
The lowest detectable level of Cortisol that can be distinguished from the Zero Standard is 0.537 ng/mL or 0.0537 µg/dl at the 95 % confidence limit.

Specificity
The following materials have been evaluated for cross reactivity. The percentage indicates cross reactivity at 50% displacement compared to Cortisol.

Steroid	% Cross reaction
Cortisol	100%
Corticosterone	29.00%
Cortisone	3.00%
11-Deoxycortisol	< 1,00%
17-OH Progesterrone	< 0,50%
Prednisone	<0,10%
Progesterone	< 0,10%
Dexamethazone	< 0,10%
Desoxycorticosterone	< 0,10%
Dehydroepiandrosterone sulfate	< 0,10%
Estradiol	< 0,10%
Estriol	< 0,10%
Estrone	< 0,10%
Testosterone	< 0,10%

Reproducibility
Intra-Assay
The intra-assay variation was determined by replicate measurements of 4 saliva samples using DRG ELISA kit. The within assay variability is shown below:

Mean (ng/mL)	4.52	0.94	12.79	17.50
SD	0.120	0.042	0.230	0.258
CV (%)	2.65	4.52	1.80	1.47
n =	20	20	20	20

Inter-Assay

The inter-assay (between-run) variation was determined by quadruplicate measurements of commercial control samples in three different days runs.

Mean	24.29 ng/mL	40.85 ng/mL
SD	1.81 ng/mL	2.38 ng/mL
CV (%)	7.47	5.82
n =	12	12

Inter-Lot

The Inter-Lot (between-lot) variation was determined by duplicate measurements of five saliva samples in three different kit lots. The between run variability is shown below:

Mean	1.22	12.65	15.81	4.16	4.53
SD	0.07	0.35	0.70	0.10	0.12
CV(%)	5.97	2.73	4.43	2.35	2.72
N =	9	9	9	9	9

Recovery

Recovery of the DRG ELISA was determined by adding increasing amounts of the analyte to three different saliva samples containing different amounts of endogenous analyte. Each sample (non-spiked and spiked) was assayed and analyte concentrations of the samples were calculated from the standard curve. The percentage recoveries were determined by comparing expected and measured values of the samples

Sample	Endogenous cortisol ng/ml	Added cortisol ng/ml	Measured OD mean of duplicate (450 nm)	Measured Conc. SLV cortisol ng/ml	Expected conc ng/ml	Recovery (%)
1	0.90	0.00	1.284	0.90		
		40.00	0.175	38.74	40.90	94.7
		20.00	0.262	22.45	20.90	107.4
		10.00	0.421	11.50	10.90	105.5
		5.00	0.608	6.42	5.90	108.8
2	8.37	0.00	0.518	8.37		
		40.00	0.160	43.57	48.37	90.1
		20.00	0.225	27.59	28.37	97.3
		10.00	0.321	17.00	18.37	92.5
		5.00	0.367	14.07	13.37	105.2
3	14.60	0.00	0.357	14.61		
		40.00	0.144	50.31	54.61	92.1
		20.00	0.187	35.55	34.60	102.7
		10.00	0.246	24.52	24.60	99.7
		5.00	0.279	20.60	19.60	105.1

Linearity

Three samples (saliva) containing different amounts of analyte were serially diluted to 1:64 with zero standard and assayed with the DRG ELISA. The percentage recovery was calculated by comparing the expected and measured values for SLV cortisol. An assay linearity of 0.537 – 77 ng/mL has been identified as the usable range. Samples above this range must be diluted and re-run.

	Sample 1	Sample 2	Sample 3
Concentr. ng/ml	33.13	80.00	23.23
Average % Recovery	107.0	99.1	97.5
Range of from	101.1	97.8	92.4
% Recovery to	114.0	99.6	104.4

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
2098 Gaither Road
Rockville MD 20850

DEC 7 2005

DRG International, Inc.
c/o Mr. Gary Lehnus
Lehnus & Associates
150 Cherry Lane Rd.
East Stroudsburg, PA 18301

Re: k051733
Trade/Device Name: DRG Salivary Cortisol ELISA test
Regulation Number: 21 CFR 864.1205
Regulation Name: Cortisol (hydrocortisone and hydroxycorticosterone) test system
Regulatory Class: Class II
Product Code: NHG
Dated: November 16, 2005
Received: November 21, 2005

Dear Mr. Lehnus:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); and good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820).

This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific information about the application of labeling requirements to your device, or questions on the promotion and advertising of your device, please contact the Office of In Vitro Diagnostic Device Evaluation and Safety at (240) 276-0484. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR Part 807.97). You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 443-6597 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Alberto Gutierrez, Ph.D.
Director
Division of Chemistry and Toxicology
Office of In Vitro Diagnostic Device
Evaluation and Safety
Center for Devices and
Radiological Health

Enclosure

Indications for Use

510(k) Number (if known): K051733

Device Name: DRG Salivary Cortisol ELISA Test

Indications For Use:

An enzyme immunoassay for the quantitative *in vitro diagnostic* measurement of active free cortisol (hydrocortisone and hydroxycorticosterone) in saliva. Measurements of cortisol are used in the diagnosis and treatment of disorders of the adrenal gland.

Prescription Use X AND/OR Over-The-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE - CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of Device Evaluation (OIVD)

Division Sign-Off

Office of In Vitro Diagnostic
Device Evaluation and Safety

510(k) K051733